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Introduction: Evidence, Expertise and Argumentation in Evidence-Based Medicine

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A philosophical discussion on evidence-based medicine (EBM) can be probably perceived almost as an oxymoron. How can "the process of systematically finding, appraising, and using contemporaneous research findings as the basis for clinical decisions" (Jenicek 2012: 23) be compatible with the critical and systematic examination of fundamental problems such as the nature of being, reality, thinking, values and perception? How can a scientific field focused mainly on the search and evaluation of evidence and aimed at solid quantifications of hypotheses (Jenicek 2003: 70) be approachable from a perspective that is characterized by probable or defeasible arguments? The challenge of this special issue is to show how a philosophical perspective on evidence is not opposed to, but rather at the grounds of evidence-based medicine.

The apparent conflict lies in the focus of the aforementioned definition, which stresses how the best evidence is obtained while almost neglecting the crucial reason why research, experiments, and trials are conducted, and evidence and findings collected and systematically analyzed—namely, a decision-making activity, a practice aimed at patient care and disease prevention (Montgomery 2005: 4). If we frame EBM within the broader perspective of medical practice, it becomes a specific type thereof, "in which the physician finds, assesses, and implements methods of diagnosis and treatment on the basis of the best available current research, their expertise, and the needs of the patient" (Jenicek 2012: 23). In this view, EBM is primarily a practice that is grounded firstly on the physician's critical thinking and capacity to choose – among the overflow of information and scientific data—the course of action that is best suited to the case at hand. EBM, despite its stress on the quantified certainties of experiments, statistics, and collection of data, does not cease to be a contingent activity that is essentially based on practical reasoning—or *phronesis* (Montgomery 2005: 4–5; Jonsen and Toulmin 1988: 26). In this sense, EBM is far more than a mere body of scientific knowledge: it is the use of clinical judgment in the rational, clinically experienced, and scientifically informed care of sick people (Montgomery 2005: 33). This characterization of EBM is indeed the one that Sackett explicitly endorsed in his famous 1997 paper that opened the era of EMB (Sackett 1997).

EBM is thus defined not only by its characteristic instruments, but more importantly by its agents and its goals. The physicians do not apply "the best evidence" in a deductive, mathematical fashion. Instead, they need to choose what evidence is most valuable for the case at hand (Jenicek 2003: 61), and this choice is always the product of reasoning under uncertainty, resulting from the incomplete or mistaken knowledge of the clinical problem and the patient in his or her complexity (Jenicek 2012: 15). Practical reasoning is what guides physicians in deciding what information to neglect when the data are not coherent, what guidelines to follow—and whether to follow them—based not only on their scientific grounds but more importantly their suitability to the circumstances of the case (Jenicek 2012: 28; Montgomery 2005: 17), and the patient's values, culture, and preferences (Sackett et al. 2000). Quoting Montgomery's observation (2005: 16), "[a]lthough biological research now provides the content for much of medicine, clinical knowing remains first of all

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the interpretation of what is happening with a particular patient and how it fits the available explanations."

The uncertainty of medicine and the practical nature of EBM bring this field into the realm of philosophy, and more specifically critical thinking and argumentation. Practical reasoning is characterized by its concrete, temporal, and presumptive nature (Jonsen and Toulmin 1988: 27). A practical conclusion is drawn only plausibly (not necessarily) from general presumptive principles or maxims (Montgomery 2005: 134)—not laws or rules—and factors that are gathered from experience, and is limited to the specific case. The core of medical practice is thus not the universal (theoretical or scientific) validity of a premise, but the defeasible nature of arguments (Jonsen and Toulmin 1988: 34–35):

> Practical arguments depend for their power on how closely the present circumstances resemble those of the earlier precedent cases for which this particular type of argument was originally devised. So, in practical arguments, the truths and certitudes established in the precedent cases pass sideways, so as to provide "resolutions" of later problems. In the language of rational analysis, the facts of the present case define the grounds on which any resolution must be based; the general considerations that carried weight in similar situations provide warrants that help settle future cases. So the resolution of any problem holds good presumptively; its strength depends on the similarities between the present case and the precedents; and its soundness can be challenged (or rebutted) in situations that are recognized as exceptional.

The logic of arguments becomes thus the core of the use of evidence, and the process that allows the connection between the generalizations drawn from the scrutiny of the best possible evidence (the current focus of EBM) and the medical practice, namely the use of such guidelines to address specific cases (Jenicek 2003: 449–452; Jenicek 2012: 28).

The decision-making dimension of EBM broadens the picture of this field to elements that have little to do with proofs, experiments, and statistics, but that are essential for the outcome – often more than the solidity of a treatment guideline (Jenicek 2003: 472). To be used to make decisions about the care of patients, the best evidence-based research needs to be integrated with clinical expertise, the communication of symptoms, and the understanding of patients' values (Sackett et al. 2000). Moreover, the concept of shared decision-making in clinical practice has modified the perception and more importantly the use of evidence in clinical practice. Evidence is being increasingly conceived as an instrument that is not purely under the physician's "exclusive jurisdiction." Sharing information and making evidence available to patients is regarded as fundamental for "supporting patients to consider different alternatives or priorities" (Elwyn et al. 2014) namely making informed decisions.

In this sense, evidence-based practice needs to address the problems of shared decision-making (Committee on Quality of Health Care in America 2001: chap. 6), grounded on the concepts of patient-centered care and patient engagement (Elwyn et al. 2014; Elwyn and Miron-Shatz 2010; Epstein and Street 2011). Not only needs evidence to be shared with the patients (that is, adjusted to their background knowledge) but patient's unique preferences, concerns, and expectations need to be integrated into clinical decisions or at least negotiated during the clinical session (Duffin and Sarangi 2018). To be functional, practical, and effective, the scientific approach to evidence needs necessarily to connect and combine with the realms of argumentation, communication, and education.

As already pointed out above, the role of argumentation is pivotal in this broader picture of EBM. Evidence is the basis of any discourse in health care *because* it plays a justificatory role in the *arguments* that are used and exchanged. Evidence plays the role of backing (Toulmin 1958; Erduran 2008; Hitchcock 2003)—i.e.: the support of the reasons offered in favor of a conclusion (Upshur and Colak 2003; Pellegrino 1999). Proposals are argued for and against by physicians and patients relying on evidence; evidence, in turn, needs to be shared and debated. For this reason, not only does a theory of argumentation and argument evaluation become crucial in health communication (Walton 1985; Rubinelli and Schulz 2006), but also the different types of dialectical purposes investigated in argumentation theory can shed light on how evidence is discussed and used to achieve a communicative goal (Walton 1989). Depending on whether the interlocutors intend to share information, make or share a decision, negotiate, or persuade each other, evidence is used and evaluated in different ways.

Communication is essential for the goals of the argumentative uses of evidence. In this rational, dialectical, and dialogical activity, evidence refers to two distinct logical elements (see Martini, in this volume). On the one hand, its meaning corresponds to the classical notion of scientific foundation of treatment guidelines and recommendations. On the other hand, it corresponds to the factual dimension of medical reasoning, and the information on the specific case that is interpreted and used for making a treatment proposal. In both cases, communication lies at the hearth of evidence use. In the first case, the argumentative use of evidence for decision-making depends on understanding, as evidence needs to be explained and communicated effectively for making a shared decision grounded on patient's preferences. By understanding how different recommendations are differently backed by distinct types of evidence, the patient can also understand the reason why a specific

treatment is recommended (Cummings 2015; Walton 2016). In the second case, the patient's provision of the information needed by the physician depends on his or her understanding of what counts as good or better evidence. Especially in chronic care, the distinction between the levels of evidence can allow patients to recognize symptoms from feelings or irrelevant observations.

Argumentation, communication, and education are intertwined in this medical decision-making process. Especially in chronic care settings, the decision-making is not only a prerogative of the physician: the patients are increasingly regarded as part of the decisions (Coleman et al. 2009; Wagner et al. 2001), and more importantly they need to make their own medical decision in their own management of the disease (Cavanaugh 2011). *Communicating* and more importantly *teaching* what evidence is and how it is evaluated and used are becoming the keystone of medical consultations (Edwards et al. 2012). The crucial role of communication is grounded on the trust relation between doctor and patient (Clark 2002; Kerse et al. 2004), especially in chronic care, where patient compliance often becomes crucial to the effectiveness of the cure (Roter et al. 1998). The scientific dimension of evidence is thus only one of the many faces of evidence-based medicine. Communication and education are cornerstones of developing a trusting relation between doctors and patients; the treatment process becomes a two-way path in which the patient is an active participant as much as the doctor is.

In this context, in which the patient is not a passive recipient but an active collaborator in the cure, the role of the patient in medical decision-making opens specific challenges in the analysis of argumentative use and the assessment of evidence. How can a patient decide in dilemmatic situations in which evidence established through statistical and quantitative means is in conflict with medical expertise (Montgomery 2005: chap. 1)? A medical expert may give an opinion that is different from the official view shared among scientists or other experts. The patient will then be left with the conundrum of which evidence to rely on: the apparently transparent and logical evidence of the numbers, or the other kind of evidence consisting in the arguments the clinician might offer in support of her or his decision to stray from the numbers? In this scenario, it becomes important to understand how to integrate clinical expert judgment with evidence-based practices, and more importantly to learn how to assess expertise, and the weight of disagreement in medical argumentation.

The aforementioned dilemmatic scenarios that medical decision-making faces when it involves the main stakeholder—the patient—, underscore the fundamental role of expertise. Evidence, without expertise and judgment, is of little use to science users, i.e., the patients, without arguments supporting one or another conclusion in a clinical situation. But how do experts transmit evidence to the public? What is their role as mediators between the evidential base of science and science users? Can we understand this role only as a sociological and, sometimes, political issue? Or is there a possibility for a methodology of expertise?

This special issue focuses on the relationship between argumentation and the critical use of evidence in medical decision-making. In particular, the research question is whether the current concepts and accounts of evidence and expertise are adequate for capturing the subjective, reason-based and argumentative component of evidence-based medical science, as well as the role of experts as mediators and communicators. The papers that this issue collects take the reader through different and interrelated topics: Martini's paper, presenting a philosophical analysis of two meanings of evidence, and how they are related to judgment in EBM, is followed by Lawler and Zimmermann's paper on the dangers of statistical hypothesis testing. The analysis of the logical and pragmatic dimension of prognosis (Chiffi and Andreoletti) and the communication thereof through metaphors (Salis and Ervas) lead to the crucial issue of how evidence is used in doctor-patient consultations, and how it is taught. The investigation of the different types and argumentative functions of evidence and the communicative process of teaching evidence use (Macagno and Bigi) is complemented by a study focused on how evidence is understood by the public, and how the development of the concept of evidence can affect evidence based reasoning (Miralda-Banda, Garcia-Mila, and Felton). In the final paper, Walton, Oliveira, Satoh, and Mebane bring the issue of evidence to the dimension of computer-assisted decision-making, in which formal argumentation systems are used to combine and compare evidence-based recommendations to make treatment proposals in case of multiple morbidity.

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